

Model Question Paper 1 with effect from 2022-23 (CBCS Scheme)

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Fourth Semester B.E. Degree Examination MACHINING SCIENCE & METROLOGY

TIME: 03 Hours

Max. Marks: 100

Note: 01. Answer any FIVE full questions choosing at least ONE question from each MODULE

| Module -1 | | | *Bloom's Taxonomy Level | Marks | CO |
|-----------------|---|---|-------------------------------|-------|-----|
| Q.01 | a | With a neat sketch explain the single point cutting tool geometry. | L2 | 7 | CO1 |
| | b | Sketch the merchant circle diagram. Write the assumptions made and derive the expression for chip thickness ratio. | L3 | 7 | CO1 |
| | c | Describe the orthogonal and oblique cutting. | L2 | 6 | CO1 |
| OR | | | | | |
| Q.02 | a | Draw the neat diagram of lathe and name the parts. | L2 | 7 | CO1 |
| | b | A 50mm bar of steel was turned at 28 rpm and tool failure occurred after 10mins. The speed was changed to 232 rpm and tool failed in 60mins of cutting time. Calculate the cutting speed to obtain 30mins of tool life. | L3 | 7 | CO1 |
| | c | Explain any three operations of the lathe. | L2 | 6 | CO1 |
| Module-2 | | | | | |
| Q.03 | a | With a neat sketch explain column and knee type milling machine. | L2 | 7 | CO2 |
| | b | With a neat sketch explain the operations of milling machines. | L2 | 6 | CO2 |
| | c | What is indexing and discuss the need of indexing. | L3 | 7 | CO2 |
| OR | | | | | |
| Q.04 | a | Explain the driving mechanism of shaper. | L2 | 7 | CO2 |
| | b | With a neat sketch, explain the radial drilling machine. | L2 | 6 | CO2 |
| | c | Explain any three operations of drilling. | L3 | 7 | CO2 |
| Module-3 | | | | | |
| Q.05 | a | With a neat sketch, explain the heat generation zone in metal cutting. | L2 | 7 | CO3 |
| | b | Define tool life. Discuss the parameters which influence the tool life. | L2 | 6 | CO3 |
| | c | Discuss the different wear mechanisms. | L2 | 7 | CO3 |
| OR | | | | | |
| Q.06 | a | Explain the properties of cutting fluids. | L2 | 7 | CO3 |
| | b | List the different types of tool materials and explain them. | L2 | 6 | CO3 |
| | c | Define machinability and discuss the factors affecting machinability. | L2 | 7 | CO3 |
| Module-4 | | | | | |
| Q.07 | a | Define standards. List and explain the different standards. | L2 | 7 | CO4 |
| | b | With a neat sketch, explain international prototype meter. | L2 | 5 | CO4 |
| | c | What is line and end standard? Explain wringing phenomenon. | L3 | 8 | CO4 |
| OR | | | | | |

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|-----------------|----------|--|-----------|----------|------------|
| Q. 08 | a | Define fit. Describe the types of fit and their designation. | L2 | 7 | CO4 |
| | b | Discuss shaft based and hole based system of fit. | L2 | 5 | CO4 |
| | c | What is the purpose of limit system? | L3 | 8 | CO4 |
| Module-5 | | | | | |
| Q. 09 | a | With a neat sketch, explain Taylors principle in the design of limit gauges. | L2 | 7 | CO5 |
| | b | With a neat sketch, explain double end and single end plug gauges. | L2 | 7 | CO5 |
| | c | With a neat sketch, explain snap gauges. | L2 | 6 | CO5 |
| OR | | | | | |
| Q. 10 | a | Define comparator. Explain reed type comparator. | L2 | 7 | CO5 |
| | b | With a neat sketch, explain sigma comparator. | L2 | 7 | CO5 |
| | c | With a neat sketch explain sin bar. | L2 | 6 | CO5 |

Model Question Paper 2 with effect from 2022-23 (CBCS Scheme)

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Note: 01. Answer any FIVE full questions choosing at least ONE question from each MODULE

| Module -1 | | | *Bloom's Taxonomy Level | Marks | CO |
|-----------------|----------|--|-------------------------------|-------|-----|
| Q.01 | a | Explain briefly the mechanics of chip formation process. | L2 | 6 | CO1 |
| | b | Explain the Merchants circle diagram for the analysis of power requirement for the machine tool. | L3 | 8 | CO1 |
| | c | In an orthogonal cutting process, the following data were obtained: Chip length obtained = 96mm, uncut chip length = 240mm, Rake angle used = 20 ⁰ , Depth of cut = 0.6mm, Horizontal component of cutting force = 2400N and vertical component of cutting force = 240N. Determine for the given data: a) Shear Plane angle b) Chip thickness c) Friction angle d) Resultant cutting force. | L3 | 6 | CO1 |
| OR | | | | | |
| Q.02 | a | Briefly discuss the broad classification of lathes. | L2 | 6 | CO1 |
| | b | With neat sketches, explain the tool layout for producing a hexagonal bolt on a capstan lathe. | L2 | 8 | CO1 |
| | c | Explain clearly the difference between capstan and turret lathe. | L2 | 6 | CO1 |
| Module-2 | | | | | |
| Q.03 | a | Explain with neat sketches Up milling and down milling methods of milling operation. Also discuss the significance of the both. | L2 | 6 | CO2 |
| | b | With a neat sketch, explain the vertical spindle column and knee milling machine. | L2 | 8 | CO2 |
| | c | Use compound indexing method for calculating the index crank movement to divide the periphery of a job into 87 divisions. | L2 | 6 | CO2 |
| OR | | | | | |
| Q.04 | a | With a neat sketch, explain crank and slotted link quick return mechanism | L2 | 6 | CO2 |
| | b | With neat sketches, explain the different operations that are performed on a drilling machine. | L2 | 8 | CO2 |
| | c | Briefly discuss the classification of grinding machines. | L2 | 6 | CO2 |
| Module-3 | | | | | |
| Q.05 | a | With a neat sketch, explain the different heat zones that are present during the metal cutting process. | L2 | 6 | CO3 |
| | b | With a neat sketch, explain the Tool-work thermocouple technique used for measurement of cutting temperature. | L2 | 8 | CO3 |
| | c | Briefly explain the Wear mechanisms of cutting tools. | L2 | 6 | CO3 |
| OR | | | | | |

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|-----------------|---|---|----|---|-----|
| Q. 06 | a | Discuss the factors that affect the cutting parameters on tool life. | L2 | 7 | CO3 |
| | b | A 50mm bar of steel was turned at 284 rpm and tool failure occurred after 10min. The speed was changed to 232 rpm and the tool failed in 60 min of cutting time. What cutting speed should be used to obtain 30 min of tool life? | L3 | 7 | CO3 |
| | c | Discuss the fundamental properties of a cutting fluid. | L2 | 6 | CO3 |
| Module-4 | | | | | |
| Q. 07 | a | What is metrology? State and explain the objectives of metrology. | L2 | 6 | CO4 |
| | b | Discuss the following standards of measurement: 1. Line standard 2. Wave length standard 3. End standard | L2 | 8 | CO4 |
| | c | Distinguish clearly between 'Line standards' and 'End standard'. Give examples of the standards. | L2 | 6 | CO4 |
| OR | | | | | |
| Q. 08 | a | Define the following terms: 1.Limits 2. Fits 3. Tolerance 4. Fundamental deviation | L2 | 6 | CO4 |
| | b | Discuss the different types of fits and their designation with neat sketches. | L2 | 8 | CO4 |
| | c | Determine the tolerance on the hole and shaft for a precision running fit designated 50H ₇ g ₆ . Given 1. 50mm lies between 30 – 50 mm 2. i (microns) = $0.45 (D)^{1/3} + 0.001 D$ 3. Fundamental deviation for 'H' hole = 0 4. Fundamental deviation for 'g' shaft = $-2.5 D^{0.34}$ 5. IT7 = 16 i 6. IT6 = 10 i State the actual maximum and minimum sizes of the hole and shaft and maximum and minimum clearances. | L3 | 6 | CO4 |
| Module-5 | | | | | |
| Q. 09 | a | What are GO and NOGO gauges? Explain how Taylor's principle is used in designing them. | L2 | 6 | CO5 |
| | b | Sketch and explain any two types of plug and ring gauges. | L2 | 8 | CO5 |
| | c | Explain briefly the different gauge tolerances. | L2 | 6 | CO5 |
| OR | | | | | |
| Q. 10 | a | Explain the basic characteristics and classification of comparators. | L2 | 6 | CO5 |
| | b | With a neat sketch, explain the Johansson Mikrokator type comparator. | L2 | 8 | CO5 |
| | c | Explain the principle and working of a sine bar. | L2 | 6 | CO5 |